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# Pension and Intergenerational Balance: A case study of Norway, Poland and Germany using Generational Accounting

by Natalie Laub and Christian Hagist

**A**bstract: In this paper we apply the method of Generational Accounting to analyse whether today's government policy burdens future generations with a heavier load than current generations. We analyse pay-as-you-go pension systems and their reforms in Norway, Poland and Germany. Our results show that, through these reforms, pension systems in all three countries became more intergenerationally balanced as the implicit debt to be paid by future generations was reduced. However, the burden is shared differently: in Norway current pensioners have to contribute to enhancing the financial sustainability of the pension system while Poland and Germany seem to protect current pensioners at the expense of younger generations.

**Keywords:** Generational Accounting, Pension Reform, International Comparison, Sustainability, Intergenerational Redistribution

## Introduction<sup>1</sup>

In the light of ageing societies, the relationship between current and future generations is a hot topic not only in political debates and TV talk shows but also in social science research.<sup>2</sup> While it is often presumed that ageing societies act to the detriment of future generations, there are also examples showing a balanced situation. In Norway, the so-called "Government Pension Fund Global" was established in 1990. Its aim is

*"to support long-term considerations in the government's spending of petroleum revenues, as well as savings to finance pension expenditure under the National Insurance Scheme. Sound long-term management will help ensure that Norway's petroleum wealth can benefit both current and future generations."*<sup>3</sup>

However, only very few countries are in the favourable situation of being able to generate fiscal surpluses. Thus for most countries the issue of intergenerational justice is much more skewed towards a battle between the generations. However, to be able to answer the question about how an intergenerationally just society should look, a definition of the term intergenerational justice is necessary. In recent decades, a growing branch of literature has developed around this research question.<sup>4</sup> In the field of economics, the most prominent view of intergenerational justice was probably established by Rawls:

*"The correct principle, then, is one the members of any generation (and so all generations) would adopt as the principle they would want preceding generations to have followed,...]. Since no generation knows its place among the generations, this implies that all later generations, including the present one, are to follow it."*<sup>5,6</sup>

Börsch-Supan, however, raises the objection that

*"a properly defined concept of generational justice has to set up*

*a balance sheet [...] which attributes all gains and costs of inventions, wars, demographic and economic crises to the respective generation according to the causative principle. This is simply impossible."*<sup>7</sup>

Only very few countries are in the favourable situation to be able to generate fiscal surpluses. Thus for most countries the issue of intergenerational justice is much more skewed towards a battle between the generations.

If the definition of intergenerational justice is a field of study on its own, it is hardly surprising that measuring intergenerational justice is far from being trivial. For the "Intergenerational Justice Index", for example, Vanhuyse combines several economic measures and a measure for the ecological footprint.<sup>8</sup> The "European Intergenerational Fairness Index"<sup>9</sup> also applies several mainly economic measures from housing costs to expenditure for R&D to assess the position of young people. Both studies succeed in providing a comprehensive insight into the complex issue of intergenerational justice. However, complementing these indices with an in-depth analysis of single measures may be worthwhile. Take for example government debt, which enters both indices. Feldstein already pointed out in 1974 that official debt is not able to reflect unfunded liabilities arising in pay-as-you-go financed social security systems. Following this line of thought, Auerbach et al. developed the method of Generational Accounting in the late 1980s:

*"Regardless of their true fiscal policies, governments can label their policies so as to report any time path of deficits or surpluses they want. The fundamental problem with deficit accounting is that the deficit does not represent the answer to a well-posed economic question. Generational Accounting, in contrast, attempts to answer two well-defined economic questions. First, what is the magnitude of the fiscal burden being left for future generations by current policy, and second, how does a change in fiscal policy alter the intergenerational distribution of welfare?"*<sup>10</sup>

At the core, Generational Accounting assumes that taxes paid minus transfers received over the remaining lifetime of both current and future generations have to equal government (explicit and implicit) debt. Thereby, Generational Accounting is not able to give a normative statement on intergenerational justice. It can only highlight fiscal consequences of current policies.<sup>11</sup> Thus, for the field of public finance, Generational Accounting can detect whether today's government policy burdens current generations with a heavier load than current generations. Therefore the focus of this paper can probably be titled intergenerational balance and should be understood as one attempt (among many) to approach the vast topic of intergenerational justice. Generational Accounting can prove very helpful, e.g. by designing the following thought experiment:

*“By what percentage would one need immediately and permanently to raise income taxes so as to be able (in conjunction with other tax receipts) to pay for the government’s projected future expenditures and its current net financial liabilities and never have to raise taxes again?”<sup>12</sup>*

Towards the end of the century and in the gloomy light of ageing populations it turned out that pension systems would fail to be as generous with future generations.[...] Slowly but surely, pension reforms were implemented in almost every European country.

Ultimately, the inventors of Generational Accounting assess the merits of their method as follows:

*“Generational accounting makes us look ahead. It makes us refine our long-term fiscal projections. It makes us consider the rising cost of policy procrastination. It makes us ask tough questions about who will pay the government’s bills. It makes us address economic issues, rather than play accounting games. And it makes us acknowledge the extent to which we are expropriating our children’s resources by accumulating fiscal liabilities, be they implicit or explicit”<sup>13</sup>.*

In the following, the method of Generational Accounting is applied to assess implications of pension reforms in different countries. When it comes to the question of intergenerational redistribution, pension schemes that follow the pay-as-you-go principle play an important role for several reasons. First of all, in many European countries public pension expenditure is one of the largest budgetary items of public finances, amounting to almost 12% of GDP in 2013 (EU28 average).<sup>14</sup> Moreover, pay-as-you-go pension systems explicitly require a contract between different generations. Thereby, this contract is not a contract in the juridical sense, but rather describes rights and duties between different generations. It aims at smoothing income over the life cycle.<sup>15</sup> Finally, many pension systems have undergone severe changes in the past two decades. In the second half of the past century pension systems in Europe were often characterised by generous regulations both regarding the benefits paid out as well as the time which could be spent in retirement. Towards the end of the century and in the gloomy light of ageing populations it turned out that these systems would fail to be as generous with future generations. Even more, it became evident that future generations would be burdened by past benefits being too generous.<sup>16</sup> Slowly but surely, pension reforms were implemented in almost every European country. Countries like Norway and Poland switched to a notional defined contribution (NDC) system while other countries – at least from a legal perspective – reformed their existing systems more gradually, e.g. Germany. The Norwegian system is chosen here because the entire pension system was changed only recently, in 2011, from a quasi-NDC system to the real NDC type. The Polish pension reform was quite similar to the Norwegian one; however, the change was more severe, has started about ten years earlier, and reforms are still in progress. While pension reform meant a complete change of the existing systems in Norway and Poland, reforms were more gradual in Germany. Nevertheless, the changes were not less far-reaching than in the other two countries.

Therefore we compare in this paper Norway, Poland and Germany to evaluate if such reforms – drastic or more subtle – really alleviate the demographically induced burden of pay-as-you-go type public retirement systems for future generations and are thus able to restore (or at least enhance) intergenerational balance.

The paper is structured as follows. First, we briefly describe our chosen set of countries with a focus on their demographic development and the pension reforms analysed. Then we describe in detail our methodology, as well as its theoretical and empirical weaknesses. We then provide the outcome of our Generational Accounts for the three pension systems and their reforms, and discuss them in detail. Thereby, the focus is on whether these reforms improved intergenerational balance and how the burden imposed by these reforms is shared between different generations. The paper finishes with a conclusion and outlook.

## Demographic developments in comparison

An international comparison of all relevant demographic developments and their parameters would be a study of its own. Therefore we will focus on the factors of life expectancy and fertility, which are the two most important driving forces of demographic development.

All three countries considered have faced an increase in life expectancy during past decades and this development is very likely to be continued. While numbers differ only slightly for Norway and Germany, they still lag behind for Poland. In 2010 life expectancy at birth was only 80.1 years for women and 71.7 years for men in Poland (see Table 1). In contrast, life expectancy at birth was 83.1 (82.7) years for women and 78.7 (77.6) years for men in Norway (Germany) in 2010. According to projections by Eurostat (2011), in 2060 life expectancy for men will be 82.4 years in Poland, 84.8 years in Germany and 85.2 years in Norway. Numbers for women will amount to 87.9 years in Poland, 88.9 years in Germany and 89.2 years in Norway. While life expectancy will still be shortest in Poland, the country is projected to catch up remarkably.

Table 1: Life-expectancy at birth<sup>17</sup>

	Male		Female	
	2010	2060	2010	2060
Norway	78.7	85.2	83.1	89.2
Poland	71.7	82.4	80.1	87.9
Germany	77.6	84.8	82.7	88.9

As regards the development of fertility rates, there are some recognisable trends in all three countries: for example, low fertility rates during the Second World War, and overall high fertility rates during the baby boom of the 1960s. While all three countries faced sharp declines in fertility rates following the baby boom, a quick and substantial recovery took place only in Norway. In 2010 fertility rates were still high in Norway with 1.9 children per woman, whereas Poland and Germany reached a number of 1.4 children per woman only.

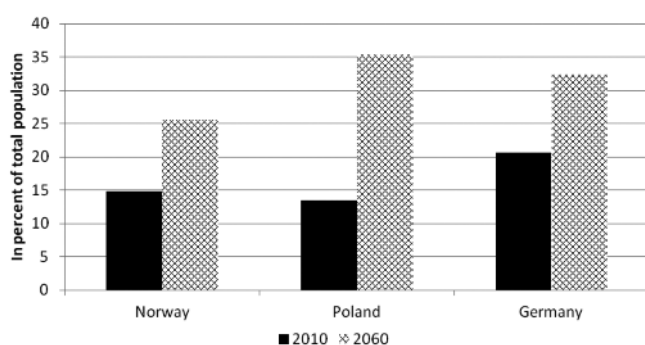
Another driving force of demographic development is migration.<sup>18</sup> Again, patterns differ considerably between Norway, Poland and Germany. In Norway, net migration was positive in

every single year from 1990 until 2010. The situation is almost similar in Germany; however, the crude rate of net migration per 1,000 inhabitants is overall lower and it turned negative in 2008 and 2009. In contrast, emigration was almost always higher than immigration in the case of Poland between 1990 and 2010.<sup>19</sup>

**In 2060 Norway will be the country with the lowest proportion of elderly people. In contrast, about one-third of the population will be 65 years and older in Germany and Poland.**

As demographic development is mainly formed by the factors described above, future trends will be quite different in the three countries. This can be seen in Figure 1: today, Poland has the lowest proportion of elderly people, followed by Norway. While population ageing will take place in all three countries, the development will be severest in Poland. In 2060 Norway will be the country with the lowest proportion of elderly people. In contrast, about one-third of the population will be 65 years and older in Germany and Poland. Over the coming decades, the share of elderly people will rise sharply in Poland and is expected to be more than two and a half times larger in 2060 than it was in 2010.

*Figure 1: Share of population aged 65 and above in 2010 and 2060<sup>20</sup>*



## Reforming pension systems

### Norway

The reformed Norwegian pension system started to take effect in 2011.<sup>21</sup> The benefit plan of the new system consists of a “guarantee pension” and a public earnings-related pension system.<sup>22</sup>

For a person to be eligible for a guarantee pension a period of residence in the country of at least three years is required. To get the full amount, 40 years of residence are necessary. The guarantee pension cannot be claimed before the age of 67. The earnings-related pension (called “income pension”) is counted against the guarantee pension. The guarantee pension is indexed annually in accordance with wage growth minus the effect of the life expectancy adjustment (see below).

The new public earnings-related pension system is of NDC type. The pension system is a pay-as-you-go (PAYG) scheme fully integrated with the state budget and financed by a mixture of general taxation and employer and employee social security contributions. Each year an amount equivalent to 18.1% of earnings up to a threshold is credited to an individual notional pension account. The accumulated holdings on these accounts are indexed annually in step with average wage growth. Furthermore, there are several

credits, e.g. for periods of raising a child, caregiving or military services. Retiring is possible between the age of 62 and the age of 75. When a person retires, entitlements are converted into a lifetime pension payment. The calculation is based on the age at retirement entry and the average life expectancy of the respective cohort. The take-up of pension benefits can be combined freely with full-time or part-time employment. Income pension is indexed annually according to wage growth minus 0.75 percentage points.<sup>23</sup>

### Poland

Currently, the Polish private sector pension system is in a transition phase after the reform of 1999, which changed it from a defined benefit scheme to an NDC scheme.<sup>24</sup> Until 2011, the new scheme applied to all workers born after 1968 and was designed as follows: Contribution is set at 19.52% of gross earnings, with payment equally split between employers and employees. 12.22% is credited to individual accounts at the central insurance institution, with a rate of return equal to the growth of the wage sum of a respective year after controlling for inflation. The remaining 7.3% is invested into private funds with an individual and variable market rate of return.<sup>25</sup> After retirement, account values are converted into an annuity which is based on the average unisex life expectancy of the age group at the age of retirement. Employees born between 1949 and 1969 are covered by the reformed system, but they can decide whether or not to participate in the funded part of the new scheme. In contrast, people born before 1949 still receive their pension from the former defined benefit scheme. If pension benefits fall below a defined threshold, there is a supplement paid out of tax accounts. In general, existing pensions are indexed with the inflation rate plus 20% of real wage growth.

**Over the coming decades, the share of elderly people will rise sharply in Poland and is expected to be more than two and a half times larger in 2060 than it was in 2010.**

Mainly due to public budget constraints, the government changed the proportions of contributions transferred to the different pillars in May 2011. The Funded Defined Contribution (FDC) part was lowered to 2.3%, with the remaining 5% going to a second NDC scheme. Contributions to the funded part were legislated to rise again until they will reach 3.5% sometime after 2017.

In 2012 the statutory retirement age for men and women insured in the NDC/FDC system was legislated to rise gradually from 60 to 67 between 2013 and 2040 for women and from 65 to 67 between 2013 and 2020 for men. The retirement age will be raised by three months each year.<sup>26</sup>

Finally, further reforms were adopted in 2013, including the following changes:

- The FDC contribution rate will be fixed at 2.92% without any future changes.
- 51.5% of FDC assets will be taken over by the general government and booked on the second NDC scheme.
- The FDC scheme will no longer be obligatory.
- A new mechanism of the FDC-related pensions will be introduced: Starting ten years before reaching the statutory retirement age, the FDC assets will be cashed at a rate of 10% annually and gradually cumulated on the respective individual second NDC account.



## Germany

In Germany, there is a mandatory PAYG scheme to which private sector employees have to contribute a certain rate of their income (18.9% in 2010) up to an annually adjusted threshold.<sup>27</sup> Payments are made by the employer and the employee in equal parts. In 2001 a voluntary, fully-funded system with tax credits was introduced. Workers can contribute up to 4% of their income to this so-called “Riester-Rente”. At the same time, an upper limit was set to contributions to the mandatory PAYG scheme (20% until 2020, 22% until 2030).

By contributing to the mandatory scheme people earn pension points, with one point corresponding to one year of average earnings. The benefits are calculated as the product of accumulated points and the differing point values after retirement. The value of one pension point is annually adjusted to the growth of gross wages minus pension contributions and notional contributions to the “Riester-Rente”. Furthermore, a sustainability factor was introduced which anchors the point value to the ratio of contributors to retirees.

The regular retirement age will be raised to 67 years between 2012 and 2031, with a possibility for early retirement after the age of 60, which has been raised to 63 since 2006. There is a penalty of 0.3 percentage points per month for early retirement and a bonus of 0.5 percentage points per month for late retirement.

In 2014 the most recent reform took place, enabling members of certain cohorts to retire at the age of 63 without any reductions in benefits if they have been working for 45 years.<sup>28</sup>

Summing up, Table 2 gives an overview over the earnings-related pension systems in Norway, Poland and Germany.

Table 2: Pension systems in Norway, Poland and Germany<sup>29</sup>

	Norway	Poland	Germany
<b>public earnings-related pension systems</b>			
<i>name</i>	inntekstspensjon	Emerytura	Altersrente
<i>type</i>	notional defined contribution	notional defined contribution	point scheme
<i>subject to mandatory insurance</i>	working population	private sector employees	private sector employees
<b>financing</b>			
<i>principle</i>	pay-as-you-go	pay-as-you-go / funded	pay-as-you-go
<i>contribution rate</i>	18.1%*	19.52%	18.9%
<i>basis of accrual</i>	wage income	wage income	wage income
<i>contribution ceiling</i>	yes	yes	yes
<b>benefits</b>			
<i>pensionable age</i>	62-75	67	67
<i>earliest possible age</i>	62	-	63
<i>period taken into account for calculation of benefits</i>	entire career	entire career	entire career
<i>indexation of accrual</i>	wage	wage sum growth controlled for inflation	wage
<i>indexation of benefits</i>	wage growth - 0.75 percentage points	inflation + 20% of wage growth	wage growth adjusted for several factors
<b>balancing mechanisms</b>			
<i>life expectancy</i>	yes	yes	indirectly
<i>sustainability</i>	no	no	yes

\* Actually distinct contributions to the pension system do not exist, but this is the amount of pension accrual.

## Measuring sustainability

### The methodology of Generational Accounting<sup>30</sup>

In the following, the method of Generational Accounting will be applied to analyse whether the reforms described above can improve intergenerational balance in the respective pension system,

and which generations bear the burden of these reforms – given that “intergenerational redistribution occurs whenever a government policy expands the consumption opportunities of one generation at the expense of another.”<sup>31</sup>

[Generational accounting] is a micro-founded macro-model which attempts to measure both fiscal sustainability on the macro- and intergenerational redistribution on the micro-level.

Generational Accounting was originally developed by Alan Auerbach, Jagadeesh Gokhale and Laurence Kotlikoff in the early 1990s to project the long-term development of public finances.<sup>32</sup> It is a micro-founded macro-model which attempts to measure both fiscal sustainability on the macro- and intergenerational redistribution on the micro-level. The intertemporal budget constraint over an infinite time horizon marks the starting point of Generational Accounting.<sup>33</sup>

$$\sum_{k=b}^{b-D} N_{b,k} + \sum_{k=b+1}^{\infty} N_{b,k} = B_b$$

$D$  denotes the agents’ maximum age and  $b$  the base year.  $N_{b,k}$  represents the present value of year  $b$ ’s net tax payments (i.e. transfers minus contributions),<sup>34</sup> made over the remaining life cycle by all members of a generation born in a specific year  $k$ . Thus the first term on the left-hand side of (1) represents aggregate net taxes of all generations alive in the base year  $b$ . The second term aggregates the net tax payments made by future generations born in year  $b + 1$  or later. Together, these two terms have to be equal to  $B_b$ , which stands for the net debt<sup>35</sup> of the pension system in year  $b$ . Thus, if living generations receive a net transfer and if the net debt is positive, this will have to be financed by the net taxes of future generations.<sup>36</sup>

The calculation of net tax payments includes several components. Firstly, all different kinds of contributions are summed up and set off against different transfer types. Thereby, fiscal policy in place in the base year is assumed to be constant over the projection horizon. Furthermore, the summation of net tax payments is conducted separately for male and female individuals to account for gender-specific profiles of contribution payment and benefit reception. The projection of future net tax payments also takes into account the number of cohort members who survive until each year under consideration. Therefore long-term population forecasts are applied.

For living and future generations, a cohort’s Generational Account ( $GA_{b,k}$ ) in a specific year is defined by dividing the aggregate remaining lifetime net payments by the number of cohort members alive in that year ( $P_{b,k}$ ):

$$GA_{b,k} = \frac{N_{b,k}}{P_{b,k}}$$

Generational Accounts are constructed in a purely forward-looking way; only the contributions paid and the transfers received in or after the base year are considered. In consequence, Generational Accounts cannot be compared across living generations as they incorporate effects of different lifetimes. However, Generational Accounts of agents born in the base year and in the future can be compared, as both are observed over their entire life cycle. Intertemporal public liabilities (*IPL*) arise when the intertemporal budget constraint of pension systems is violated:

$$IPL_b = B_b - \sum_{k=b-D}^{\infty} N_{b,k}$$

The amount of intertemporal public liabilities measures aggregate unfunded claims on future budgets, assuming that the present policy will hold for the future. The Sustainability Gap is now derived by setting intertemporal public liabilities in relation to the base year's GDP:

$$SG_b = \frac{IPL_b}{GDP_b}$$

On the one hand, the Sustainability Gap can easily be interpreted as comparable to the Maastricht criteria (however, it accounts for both debt incurred in the past as well as in the future). On the other hand, results are highly sensitive to changes in underlying assumptions, especially the difference between growth and interest rate and demographic scenarios.

Generational Accounts cannot be compared across living generations as they incorporate effects of different lifetimes. However, Generational Accounts of agents born in the base year and in the future can be compared as both are observed over their entire life cycle.

This drawback can be overcome by applying alternative indicators, which close the Sustainability Gap over a certain time horizon.<sup>37</sup> Benz and Fetzer<sup>38</sup> show that the strong interpretation of the Sustainability Gap in a Generational Accounting framework such as ours can easily be transferred into other methods assessing fiscal sustainability, like the OECD method or econometric approaches. The question at hand is if there is at all a relation between the Sustainability Gap and intergenerational balance or even intergenerational justice. Perhaps the Ponzi game, if played by governments, could be played for eternity? As regards Germany, current debt levels are obviously not punished by financial markets, which would be at least an indication that the Ponzi game could not be going on for ever. Take Japan as another example, which has already accumulated an official debt of over 250% of GDP and still enjoys an A rating on its bonds. However, these may be exceptions which prove the rule. Reinhart and Rogoff for example<sup>39</sup> show in their prominent work that countries exceeding certain values of public debt are reducing their growth potential. Therefore some generations have to pay a certain share of the Sustainability Gap, or in other words the intertemporal budget constraint is binding.

#### *Theoretical and empirical limitations*

On the theoretical level, one of the major objections towards Generational Accounting is the question whether or not the

underlying neoclassical life-cycle hypothesis holds. Neoclassical theory assumes that individuals plan and allocate resources over their entire life.<sup>40</sup> This also underlies Generational Accounting, as net tax payments are calculated over the remaining life cycle. However, if the individual planning horizon was much shorter or longer, implications of Generational Accounting results could be misleading. Empirical evidence shows that individuals are neither purely short-sighted (if they were, voluntary long-term savings would not occur) nor perceive their families as infinitely living dynasties (if this was the case, intergenerational redistribution due to fiscal policy would be offset by bequests).<sup>41</sup> Thus, while the neoclassical life-cycle hypothesis does not perfectly describe reality, it seems to strike a fairly good balance.

Another drawback is that Generational Accounting is a partial equilibrium analysis and thus does not account for macroeconomic feedback effects.<sup>42</sup> This would only be possible in a dynamic general equilibrium model. Thus the incidence of e.g. an increase in contribution rates cannot be measured correctly. Therefore Generational Accounting is not able to provide a base for welfare judgements.

On the theoretical level, one of the major objections towards Generational Accounting is the question whether or not the underlying neoclassical life-cycle hypothesis holds. Neoclassical theory assumes that individuals plan and allocate resources over their entire life.

Regarding empirical limitations, the most severe one is the use of single growth and discount rates.<sup>43</sup> The discount rate incorporates both the cost of waiting and the risk of future payment streams. Actually, this should be reflected in different rates. Furthermore, the choice of growth and discount rates is more or less arbitrary. However, the outcome of Generational Accounting mostly depends on the difference between growth and discount rates, which seems to be fairly stable over time.<sup>44</sup>

Furthermore, it can be criticised that Generational Accounting holds constant age- and gender-specific tax- and transfer-profiles.<sup>45</sup> However, increasing female labour market participation or the overall prolonging of working life due to augmented retirement ages affect these profiles. Furthermore, Generational Accounting does not incorporate private intergenerational transfers (which might cushion fiscal policy). The setting-up of so-called National Transfer Accounts tries to overcome these limitations. National Transfer Accounts are based on the System of National Accounts but estimate age-specific profiles for income, consumption and savings; sometimes even for time-use.<sup>46</sup>

Finally, the projection of demographic developments, which have a major influence on the results of Generational Accounting, is deterministic. Again, including stochastic elements could mitigate this point of criticism. Another remedy comes from carrying out sensitivity analyses, which is also useful to oppose criticism concerning the choice of growth and discount rates.<sup>47</sup>

Generational Accounting faces important limitations both applying to forecasts in general and to this method in specific. However, one important advantage of Generational Accounting is that it shows the effects of prolonging base-year's fiscal policy into the future. Thus the results of Generational Accounting can be seen as a worst-case scenario and can serve as a warning to policy-makers. It can also be shown that Generational Accounting is a valuable method when the number of countries which apply this method

is considered. A respective table can be provided by the authors upon request.

**The results of Generational Accounting can be seen as a worst-case scenario and can serve as a warning to policy-makers.**

#### *Limitations in scope<sup>48</sup>*

The method of Generational Accounting was developed to assess long-term sustainability of public finances. However, with this focus the important issue of adequacy may fall from view. The significance of adequate benefits can nicely be illustrated by looking at public pension systems and the reforms undertaken in this field during the past few years.

Until the 1990s, public pensions became more generous, both in terms of the amounts paid as well as in terms of the period that could be enjoyed in retirement. Facing severe demographic changes, securing the long-term sustainability of pension systems became an important issue. Reforms enacted in this context often focused on defined contribution schemes and prefunding. They were thus designed to unfold their positive effect on sustainability in the medium to long run. However, in the course of the financial crisis starting in 2008, many European countries faced large budget deficits and were pressured severely. They were forced to enact reforms with short-term effects. Thus the focus on pension reforms shifted to measures like raising the pensionable age, restricting access to early retirement options or cutting pension indexation. Often these reforms did not grant generous grandfathering regulations but rather applied to current pensioners as well. Furthermore, these reforms reinforced the link between retirement benefits and labour market outcomes. Employability and chances to find and hold a job providing sufficient and secure income will thus become more important in the future. Reaching this goal may be easier for some parts of the population than for others. However, the Generational Accounting analysis does not account for these kinds of distributional issues.

Besides pension reforms enacted during the crisis, protecting people from old-age poverty and securing a decent living standard is and will remain a genuine task of public pension policy. However, these reform measures nicely illustrate the trade-off which may occur between adequacy and sustainability. To provide adequate pensions, increasing benefit levels may become necessary at some time in the future. Guarantee of income security in old age and protection against poverty might be difficult, if lowering benefits was the only way to ensure fiscal sustainability. There may not only be a trade-off between adequacy and sustainability, but the two goals may also be intertwined. Inadequate pension benefits will harm long-term financial sustainability as earlier or later policy reversals will become necessary. Thus an appropriate balance between adequacy and sustainability should be pursued.

**Inadequate pension benefits will harm long-term financial sustainability as earlier or later policy reversals will become necessary. Thus an appropriate balance between adequacy and sustainability should be pursued.**

#### **General assumptions and data description**

Presumed life expectancy determines the duration of payment of pension annuities. Therefore it is a main input factor for the as-

essment of fiscal sustainability. Our assumptions on the future development of life expectancy are based on the demographic projection of Eurostat, EUROPOP2010.<sup>49</sup> This guarantees a harmonised set of assumptions for cross-country comparison. Data on future fertility rates and migration development are also taken from EUROPOP2010.

Expected wage growth considerably determines the level of future pension benefits, as all three schemes incorporate this figure both in the adjustment of accrued pension rights and in the indexation of pension benefits. In recent years wage growth was relatively heterogeneous across the three countries. We will consider these heterogeneous wage growth paths in our calculations and apply the productivity assumptions of the Ageing Working Group<sup>50</sup> (AWG).<sup>51</sup> Thereby, it is assumed that wages grow in line with labour productivity per hour. For Norway, this means that for the next decade wage growth will amount to 1.7%, while from 2025 on, this figure will fall to 1.5%. In Germany, wage growth started at 0.9% in 2010 and is predicted to rise slowly until it reaches the target value of 1.5% in 2025. Figures are projected to be much higher in Poland. Starting from 2.5% in 2010, 2.9% was predicted to be reached in 2015. Hereafter, wage growth will slow down, albeit on a very smooth path, so that it will still amount to 2.0% by 2045. Only in 2060 will the 1.5% mark be reached.

When it comes to choosing the interest rate, we also follow the AWG and apply a 3% interest rate in real terms, which reflects more or less the average bond yields of past decades.

While the AWG focuses on future pension expenditure, we extend this perspective by incorporating the revenue side in our calculations as well. For that reason, we use age- and gender-specific contribution profiles, which are weighted with our demographic projections and adapted to economic forecasts. Furthermore, we take into account that in Norway, for example, there are no specific pension contributions and that often a proportion of pension expenditure is financed via the tax revenues of the general government. Usually, selected non-contributory periods, such as times of child care or unemployment, are credited in the benefit formula and funded by tax inflows into the pension scheme budget. Therefore we additionally estimate future tax payments – assuming that these expenses are covered by revenues from value added tax, as the value added tax is levied in every country and has a very broad tax base.

The above section, which described the institutional settings, showed that in each of the three countries important reforms took place regarding the retirement age. While in Poland and Germany retirement age is legislated to rise, in Norway a fixed retirement age of 67 years has been abandoned in favour of a flexible regulation making retirement possible from 62 years on. Now, through this flexibility many persons could be tempted to retire as early as possible.<sup>52</sup> However, as the direct effect of early retirement for the pension system is covered by actuarially fair discounts, we abstract from possible early retirement. Effects on the labour market and therefore on taxes and transfers are thus not covered by our approach. For Poland and Germany, increases in retirement age are reflected in our calculations according to legislation.<sup>53</sup>

In the above description of institutional settings, pension reforms enacted until spring 2014 were taken into account to display as complete a picture as possible. For the sake of comparability between the three countries, the following results will however only entail reforms which had already become law by September 2011. At this point in time, the redesign of pension rules had largely

been completed in Norway and Germany. In Poland, important reforms were enacted in 2013. Thus, to be able to compare the Polish pension system to the other two systems, these reforms are included in the projections.

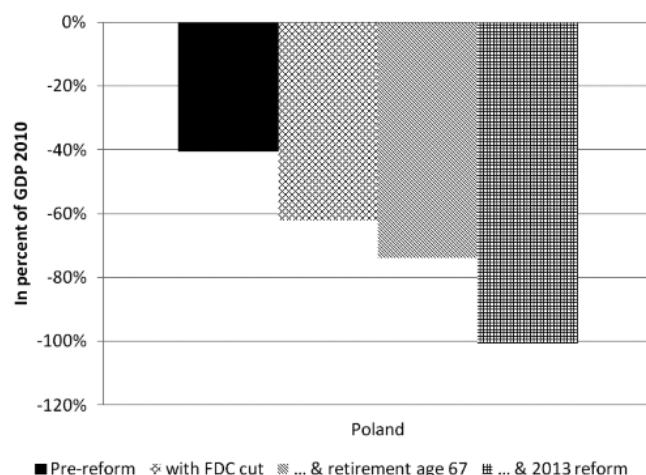
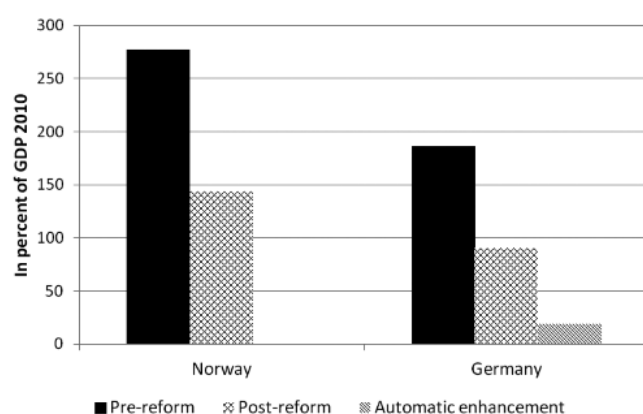
### Sustainability gains of pension reforms in comparison

The concept of Sustainability Gaps can help to show the overall effect of pension reforms by comparing the Sustainability Gap of a country before and after a reform. If a reform reduces the Sustainability Gap, this means that it is beneficial from the perspective of intergenerational balance, as the burden which has to be borne by future generations shrinks. In the following, Sustainability Gaps before and after the reforms are estimated for Norway, Germany and Poland.

#### *The overall impact*

Before the intergenerational distribution of the burden induced by pension reforms is analysed, a glance at the overall impact of these reforms may be worthwhile. The large impact of the Norwegian pension reform is clearly visible in Figure 2. The Sustainability Gap was almost cut in half from 277.7% of GDP to 144%. This result holds if the assets from the Norwegian Government Pension Funds are taken into account. In 2010 these assets were worth 103.8% of GDP. However, in our calculations we do not include the value of the oil and gas reserves. In theory, one could also add the present value of oil and gas reserves, which would significantly decrease the Sustainability Gap. From this regard, Norwegian pension policy could probably even be labelled sustainable.<sup>54</sup> Germany started from a lower level of 186% of GDP and will arrive at 18.7% eventually. Here it is taken into account that imbalances can be offset by a rise in the contribution rate.<sup>55</sup> Without this possibility, the Sustainability Gap would amount to 90% of GDP instead of 18.7%. In contrast, the Polish system has more than closed the Sustainability Gap. Figures for Poland show that each new reform added to future surpluses. Eventually, these will amount to 100% of GDP. This is mainly because Poland currently faces a transition period from a pay-as-you-go system to a partially funded one. The transition is financed by current tax inflows projected for the future. Jabłonowski and Müller<sup>56</sup> show that the Sustainability Gap would however, be positive, if it was assumed that in the future only contribution payments have to finance pension benefits. Thus the negative Sustainability Gap shows that in the future tax inflows of the current amount will probably not be necessary. However, without any tax inflows, the reforms enacted cannot render a pension system sustainable.<sup>57</sup>

Figure 2: The effect of pension reforms on the Sustainability Gap<sup>58</sup>



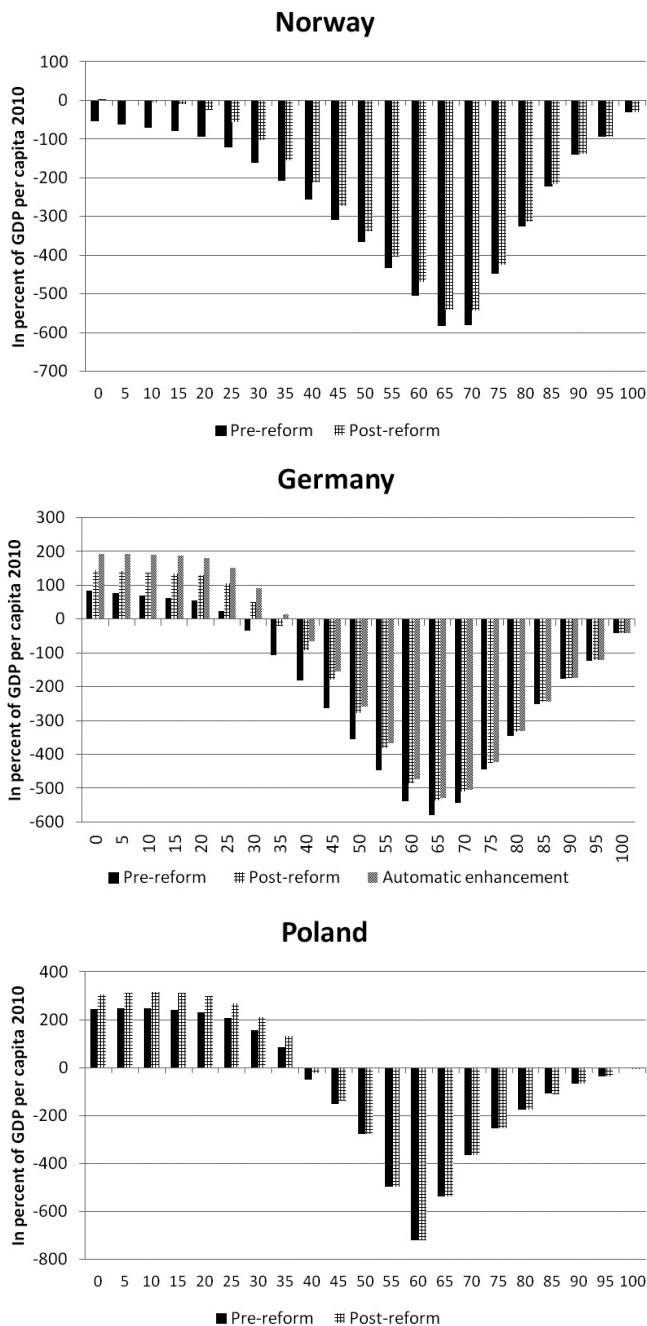
Comparing post-reform Sustainability Gaps in Norway, Poland and Germany, the Norwegian pension policy does not seem to be sustainable, i.e. it seems as if in Norway future generations will have to bear a larger burden than current generations do. Yet, applying the concept of Sustainability Gaps, one has to bear in mind that cross-country comparison is applicable only to a limited extent, e.g. because of different demographic developments in each country. Demographic developments determine a country's future economic power and thus the ability to pay debts. For countries with increasing population numbers (Norway) the economic power differs from countries with declining population numbers (Germany and Poland).<sup>59</sup>

Demographic developments determine a country's future economic power and thus the ability to pay debts.

However, insofar as populations grow mainly due to migration, the integration of immigrants is crucial for the impact of migration on the pension system's sustainability. For example, Frassi et al.<sup>60</sup> show for Italy that the Sustainability Gap can be closed with the help of immigration if integration is successful. In contrast, Bahnsen et al.<sup>61</sup> show that forced migration to Germany in 2015 had a negative impact on the overall Sustainability Gap.<sup>62</sup> The impact of pension reforms on intergenerational burden-sharing can be made visible through Generational Accounts. They set aggregate remaining lifetime net payments in relation to the size of a corresponding cohort. Figure 3 shows Generational Accounts before and after the pension reforms for Norway, Germany and Poland. The sinusoidal pattern that can be observed in the German and the Polish figure is very common in countries with strong pay-as-you-go systems. The younger generations, up to the age of 35, finance the older generations. In the Norwegian figure, Generational Accounts are only positive for very young cohorts close to the newborns. This means that in the course of their remaining life cycle almost everyone will receive more pension benefits than they will contribute to finance the system. The comparison shows that in Norway and Germany, almost every cohort has to contribute to the reduction of the Sustainability Gap. In Poland, younger cohorts have to contribute while older ones do not. Thus, from the perspective of intergenerational balance, it seems as if the reforms in Germany and Norway were more equalised than in Poland.



Figure 3: Generational accounts before and after the pension reforms<sup>63</sup>



As Generational Accounts are strictly forward-looking, a comparison (of Generational Accounts) for living generations is not possible. Thus, for a thorough analysis of intergenerational balance, another indicator is necessary.

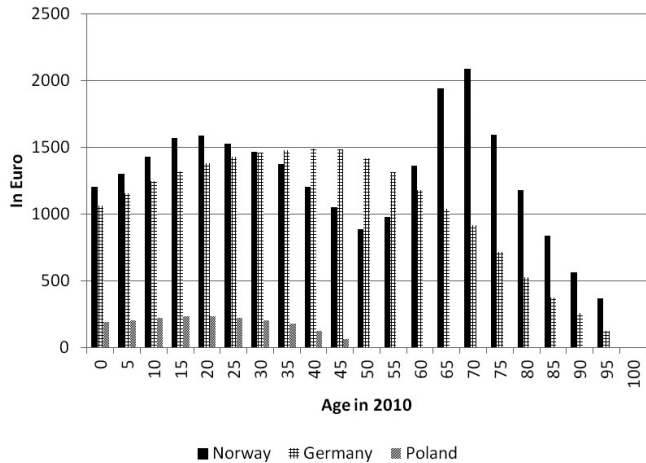
#### Who bears the burden of reforms?

Using the method of Generational Accounting can help to make intergenerational distributional effects of pension reforms visible. This is done in a first step by calculating Generational Accounts before and after a reform for every single cohort. Secondly, for a comparison between cohorts, the resulting differences in Generational Accounts before and after a reform are expressed as annuities per cohorts. Thus it can be shown which cohort bears the largest burden of a particular pension reform. For example, the Norwegian newborns have a close to zero Generational Account in the new system. This means that, over their life cycle, taxes paid and transfers received will neutralise. In the old system, they re-

ceived a significant net transfer from the pension system. Thus the burden analysis shows that the newborns contribute significantly to reducing the Sustainability Gap of the pension system. The results of this burden analysis are shown in Figure 4.

Using the method of Generational Accounting can help to make intergenerational distributional effects of pension reforms visible. This is done in a first step by calculating Generational Accounts before and after a reform for every single cohort.

Figure 4: Induced burden of pension reforms per cohort in annuities<sup>64</sup>



In the Norwegian case, the burden of cohorts aged 65 and 70 catches the eye. It is relatively high and it is the largest of all cohorts. Here, the impact of a change in indexation rules is clearly visible.<sup>65</sup> Thus, for the Norwegian case, the suspicion does not hold that pension policy favouring current beneficiaries is enacted at the expense of younger generations. In contrast, cohorts approaching retirement bear the smallest burden. This pattern has different reasons. Firstly, the transition period protects generations still working but close to retirement age from the full effect of the longevity adjustment factor.<sup>66</sup> Those with 47 years of age are the first fully affected cohort. Nevertheless, they are better-off than their older counterparts, as discounting reduces their losses in present value. Younger cohorts are also worse off. This is due to the increasing life expectancy of these cohorts. In the old pension system, increasing life expectancy meant increasing benefits in present value terms. The linking of benefits to life expectancy, as in the new system, reverses this gain into a loss.<sup>67</sup>

As regards Germany, the burden is distributed more equally across the generations. The particularly large cohorts (the baby boomers), in 2010 aged around 50 years, bear a larger part of the burden than their Norwegian counterparts. On the other hand, in Norway pensioners contribute to bearing the burden to a larger extent than in Germany. German pension reforms mostly affected younger cohorts and protected those who were already retired. In the Polish case, figures are much smaller due to the fact that the pension system is actuarially quite fair. Recent reforms have raised contributions but at the same time, accrued pension rights went up as well.

Overall, Figure 4 shows that the burden induced by pension reforms in the three countries considered is distributed differently. In Norway current pensioners bear quite a large share of the burden. In contrast, pension policy seems to favour current

beneficiaries at the expense of younger generations in Poland and Germany.

## Conclusion and outlook

In this paper we applied the method of Generational Accounting, which can reveal whether today's government policy burdens future generations with a heavier load than current generations. Thus, with this focus on measuring intergenerational balance, we approached the vast field of intergenerational justice. We analysed pay-as-you-go pension systems and their reforms, as these systems by design chain different generations through rights and duties.

**In Norway current pensioners bear quite a large share of the burden. In contrast, pension policy seems to favour current beneficiaries at the expense of younger generations in Poland and Germany.**

Our results showed that first of all, in the three countries considered, pension reforms could reduce the Sustainability Gap. This means that pension systems became more balanced in an intergenerational sense as the implicit debt which has to be paid (or at least serviced) by future generations was reduced. A more thorough analysis revealed that the burden of pension reforms is shared differently in the three countries. In Norway current pensioners also have to contribute to enhancing the financial sustainability of the pension system. In contrast, Poland and Germany seem to protect current pensioners at the expense of younger generations.

However, we also pointed out that Generational Accounting is not able to take into account the important issue of adequacy. When it comes to pension reforms, sustainability is an important constraint, especially regarding intergenerational fairness. While sustainability can be measured by Generational Accounting, adequacy cannot. However, the latter concept is also important, as at least in democratic societies, fiscal sustainability alone is not sufficient for a sustainable pension system. Without acceptable adequacy, the pension system is not politically viable, as the median voter will become older and therefore make adequate pensions a political priority.<sup>68</sup> Therefore, while fiscal sustainability may be a helpful yardstick to establish sensible policies, it is important not to lose sight of adequacy.

In our case studies, with Poland as an example we were able to show that fiscal sustainability might be achieved at a high price. Recent pension reforms have led to financially sound systems, but at the same time it is questionable whether these systems will be able to grant adequate pension benefits in the future. Therefore the question arises: will reforms be enforced as they were legislated or will a governmental intervention become necessary? Political pressure on pension systems is already high and it can be guessed that it will rather increase than decrease in the future.<sup>69</sup> Today it is already apparent that resisting this pressure is not always what politicians want. The case of Germany can serve as an example here: after more than a decade of exemplary pension reforms, the Merkel government decided to take a step back by re-introducing early-retirement channels. The situation is even more severe in Poland, where large parts of the pension reform have been withdrawn.

The success of pension reforms is highly dependent on whether people accept them and adapt to them or not. Thus a transparent

reform process and a broad approval of reform steps taken might be helpful to create a pension system that is not only sustainable and guarantees adequate benefits but is also politically stable.

**The success of pension reforms is highly dependent on whether people accept them and adapt to them or not.**

The diversification of risks can support the overall stability of old-age income provision. It can be reached by establishing a multi-pillar system of old-age income.<sup>70</sup> In the countries considered here, an expansion to more than one pillar was part of recent reforms. Nevertheless, it should be kept in mind that second and third pillars can only cushion reductions in public pension systems if they cover as many parts of the population as these systems do. In putting more weight on second and third pillars, politicians have to make sure that pension provision granted by these pillars is affordable for as large a part of the population as possible. This holds especially for those who would be exposed to the risk of being poor by relying on public pensions only. In the end, the question boils down to the appropriate mixture of both pay-as-you-go and funded parts of old-age provision. In our mind, to abolish public pension systems altogether would for sure not be intergenerationally justifiable. In the end, to have real sustainable reform, sustainability alone is the necessary (while adequacy being the sufficient) condition.

Our results show that while it may be impossible to have a numerical (hence positive) measurement of intergenerational justice, the societal debate about such questions is more than ever important. Despite all its limitations, the method of Generational Accounting can contribute to this debate by revealing whether current policy is intergenerationally balanced in a sense that it does not load a heavier burden on future generations than on current ones. Additionally, it can be shown which generation has to bear the largest share of reform-induced burdens. Therefore Generational Accounting may be a valuable instrument to assess the merits and downsides of different policy alternatives. However, for a comprehensive picture, it has to be complemented by other assessments.

## Notes

- 1 We are grateful to Katharina Saunders, Stefan Seuffert and three anonymous reviewers for valuable comments.
- 2 Hardach 2006: 5 even supposes that the focus of distributional issues will be on generations in the 21st century (having been on class and gender in previous centuries).
- 3 Norwegian Ministry of Finance 2017: 9.
- 4 For an overview see Tremmel 2008 and especially Tremmel 2012.
- 5 Rawls 2001: 160.
- 6 For a more detailed discussion, see Hüther 2008.
- 7 Börsch-Supan 2003: 224, own translation.
- 8 See Vanhuyse 2013.
- 9 See Leach/Broeks/Østensvik/Kingman 2016.
- 10 Auerbach/Kotlikoff/Leibfritz 1999: 4.
- 11 This argumentation follows Börsch-Supan 2003: 225.
- 12 Auerbach/Kotlikoff/Leibfritz 1999: 3.
- 13 Auerbach/Kotlikoff/Leibfritz 1999: 6.
- 14 See Directorate-General for Employment, Social Affairs and Inclusion and Social Protection Committee 2015. Pension expenditure also enters both the European Intergenerational Fair-

ness Index and the Intergenerational Justice Index.

15 Hardach 2006 provides a comprehensive insight into the historical development of the generational contract in Germany.

16 Thereby, Generational Accounting contributed substantially to unveil this.

17 Source: EUROPOP2010, own illustration.

18 As forecasts about migration are highly speculative, this factor is not looked at in detail in the subsequent estimations. For the assumptions on migration applied later in our calculations see the corresponding section below.

19 Data from Eurostat database 2014, table tsdde230.

20 Source: own calculation based on EUROPOP2010

21 For a more detailed description see Pedersen 2012.

22 As the reformed pension system has been in operation since 2011 only, the former system is still quite important. Persons born in 1953 and earlier are entirely covered by the former system. For persons born in 1963 and later the new system applies; those born in between are covered by both systems.

23 Besides these components of the public pension system, about 50% of all private sector employees are covered by the so-called AFP-arrangement, which from 2011 on is a lifetime top-up of the public earnings-related pension.

24 A detailed description of the NDC system in Poland can be found in Chlón-Dominczak/Góra 2006.

25 This part of the pension system is often referred to as the Funded Defined Contribution (FDC) part.

26 Nevertheless, the reform leaves special privileges granted in past decades unchanged, e.g. to miners, teachers or pre-retirement beneficiaries.

27 A detailed description of the German pension system can be found in Börsch-Supan/Wilke 2006.

28 However, this reform is not taken into account in the following calculations.

29 Source: own illustration.

30 The following two sections draw heavily on Hagist 2008.

31 Kotlikoff 1999: 10.

32 See Auerbach/Gokhale/Kotlikoff 1994, 1992 and 1991. For a detailed and more formal description see Hagist/Raffelhüschen/Risa/Vårdal 2013. For the demographic projections, we use Bonin 2001's projection program which is based on the component method proposed by Leslie 1945. The standard procedure has been extended to distinguish between genders and to incorporate immigration. Parameters like life expectancy and fertility change for every cohort according to the general trend.

33 Benz/Fetzer 2006 show that other assessment techniques use different time horizons, for example until one specific year or over a certain period of time. However, as these choices are rather arbitrary and, therefore, at least in theory, the intertemporal budget constraint is not binding, we opt for the strict interpretation of Generational Accounting according to Raffelhüschen 1999.

34 In case public finances in general are assessed, all different types of taxes, contributions and transfers are considered.

35 However, in some countries – as for example Norway – there are large funds instead of a net debt. The Norwegian Government Pension Fund has a wide influence on pension system finances.

36 Auerbach/Kotlikoff 1999: 31 explain that the intertemporal budget constraint does not imply that debt has to be paid off at any date in the future. Rather, it requires debt to grow at a rate

smaller than the discount rate. Thus deficits can exist in the long run. However, they have to be serviced.

37 Tepe/Vanhuyse 2012 point to the important issue of timing reforms. Therefore, probably, also the variety of less-sensitive indicators towards economic variables may have different political sensitivity.

38 See Benz/Fetzer 2006.

39 See Reinhart/Rogoff 2010.

40 The so-called life-cycle theory was established by Modigliani/Brumberg 1954.

41 Empirical analyses were for example conducted by Mello/Kongsrud/Price 2004, Reitschuler/Cuaresma 2004 and Kotlikoff 2004.

42 This was put forward by Börsch-Supan 2001.

43 This critique is extensively debated in CBO 1995.

44 See Fetzer 2006.

45 An extensive review of Generational Accounting can be found in Haveman 1994, where the issue of constant profiles is also discussed.

46 A detailed description of National Transfer Accounts can be found in United Nations 2012 and d'Albis/Moosa 2015. Hsieh/Tung 2016 use National Transfer Accounts within a Generational Accounting framework to assess the intergenerational burden-sharing of the Taiwanese public pension system. Gál/Vanhuyse/Vargha 2018 show that as soon as private intergenerational transfers of both cash and time are accounted for, children actually receive more per capita resources than the elderly.

47 It can also be mentioned that the base-year's budget might be influenced by business cycle effects. This might have an important effect, as Generational Accounting analysis starts from the base-year and projects base-year values into the future. However, Benz/Hagist 2007 could show that the effect is rather small.

48 This section draws on Directorate-General for Employment, Social Affairs and Inclusion and Social Protection Committee 2015.

49 For more details see Eurostat 2011.

50 The Ageing Working Group was commissioned by the Economic Policy Committee of the European Union to improve the quantitative assessment of the long-term sustainability of public finances. In this regard the AWG published the Ageing Report in 2009, 2012 and 2015. The long-term projections underlying the Ageing Report assume that in all countries labour productivity growth will converge to 1.5% in the long run. To model the convergence path, it is assumed that countries where GDP per capita is low at present will display a higher potential for catching up. As the GDP per capita is currently below the EU average in Poland, the catching-up process is modelled via higher growth rates in the near future. For more details see Directorate-General for Economic and Financial Affairs and Ageing Working Group 2011: 121-128.

51 For the country-specific assumptions see Directorate-General for Economic and Financial Affairs and Ageing Working Group 2012.

52 Indeed, Brinch/Vestad/Zweimüller 2015 show that due to the Norwegian pension reform claiming pensions at the age of 62 became more likely.

53 For Germany, we included the step-by-step increment of the retirement age up to 67 but not the most recent reforms which

introduced exceptions for long-term employees and higher payments for specific groups like mothers. For details about these reforms, and their impact on fiscal sustainability, see Hagist/Moog/Raffelhüschen 2014.

54 For a calculation incorporating the present value of oil and gas reserves see Hagist/Raffelhüschen/Risa/Vårdal 2013.

55 In the German case, a possible increase in the contribution rate is taken into account, because it is restricted by law that the contribution rate is allowed to grow at most up to 22% by 2030. Taking this increase into account can be viewed as a clearly defined benchmark scenario. In other countries, for example in Norway, such rules do not exist. Including general tax increases would be arbitrary as regards the amount of the increase. Therefore we do not take account of tax increases in situations in which they are not clearly defined in advance.

56 See Jabłonowski/Müller 2014: 26.

57 Vanhuyse 2013: 27 shows that current Polish policy strongly favours elderly cohorts. However, our long-term analysis shows that through the far-reaching reforms enacted, at least in the pension system, intergenerational balance can be achieved.

58 Source: own calculations.

59 There is always the question whether countries can outgrow their fiscal sustainability problems. As Holmøy 2006 shows this depends on the wage dependency of the expenditure side compared to the revenue side of public coffers. In our case, pension benefits grow in most cases less than wages, which our model takes into account. Changing the level of wage growth only changes the results qualitatively if the discount rate is chosen below the growth rate. However, this is a dynamic inefficiency and therefore outgrowing the pension problem purely is not possible.

60 See Frassi/Hagist/Pammolli 2017.

61 See Bahnsen/Manthei/Raffelhüschen 2016.

62 Unfortunately, the degree of integration could not be included in the calculations of this paper. However, this would have been worthwhile especially in the cases of Norway and Poland. First of all, these two countries display very different migration patterns (as explained above). Second, migrants from Poland form by far the most important group of foreigners in Norway. Thus there is considerable room for future research.

63 There is always the question whether countries can outgrow their fiscal sustainability problems. As Holmøy 2006 shows this depends on the wage dependency of the expenditure side compared to the revenue side of public coffers. In our case, pension benefits grow in most cases less than wages, which our model takes into account. Changing the level of wage growth only changes the results qualitatively if the discount rate is chosen below the growth rate. However, this is a dynamic inefficiency and therefore outgrowing the pension problem purely is not possible.

64 Source: own calculations.

65 Indexing pensions in payment to a rate lower than wage growth leads to benefit losses, especially for those who are at the beginning of retirement because they face the longest period of benefits.

66 Why it is exactly these cohorts who were protected most, would be an interesting analysis on its own.

67 We model increasing life expectancy until 2060, which is why there is again a turn in the burden for the cohorts between 15 and 20 years of age.

68 In the sense that in the future a majority will still be in favour of the system.

69 Actually, Tepe/Vanhuyse 2012 demonstrate that politicians in ageing societies seem rather to opt for medium-size pension reforms. Thus they seem to try avoiding larger reforms which would cause more opposition from the electorate and are therefore politically riskier.

70 A detailed analysis of the different risks in pay-as-you-go and funded pension pillars and an estimation of the optimal mix of these two pillars is e.g. provided in Börsch-Supan 2005, Lindbeck/Persson 2003 and Anders/Groneck 2017.

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